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RECENT LITERATURE.

Evolution of the Colors of North American Land Birds.[1]—This octavo of 361 pages, published by the California Academy of Sciences, the author Mr. Charles A. Keeler, modestly calls a study. The views set forth are more or less provisional and tentative, and are intended to direct research into this new field of ornithological inquiry. The subject-matter of the essay is preceded by a discussion of the various views held as to the laws conditioning evolution, such as inheritance of acquired characters; the nature of species; natural and sexual selection, and isolation, as factors in the evolution of species. In concluding this rather lengthy introduction, the author remarks " that life has evolved in accordance with tolerably definite and unvarying laws, 'and that the element of chance, if any such there be, is a very limited one."

In Part II the colors of North American birds, are treated of under the following heads: Modes of plumage changes; General principles of color in Birds; The proportion and distribution of the colors in the North American genera; The pattern of markings; Variation of color with sex, age and season; The direct influences of the environment; Geographical distribution as a factor in the evolution of colors; Orders, families and genera of North American Birds, considered from the stand-point of their evolution.

The theory of bird colors which Mr. Keeler seeks to establish is as follows: Pigment is a chemical composition thrown off from the system of the bird, probably as a product of waste, and lodged in the integument. The chemical substance thus generated varies in different groups of birds, but is probably generally constant in the species of one genus, or frequently in an entire family. A certain genus would thus be capable of generating only a given number of fundamental colors, but natural and sexual selection by combining and rearranging this limited assortment can produce a variety of effects.

Associated with this theory is the Law of Assortment of Pigments; that is, that the primitive color is a composite which, when more or less completely resolved into its component elements gives the specialized tints of the species or genus. If the system of the bird from which some of the present highly colored genera were evolved produced normally two pigments, unless some distributing force were brought to bear upon them, they would naturally be combined at first. It is only after long selection that the component colors become apparent. The examples cited are, as might be expected, among the most highly specialized genera. The woodpeckers are colored black, white and scarlet. The combination would produce brown, which is still the body color of some species. In the genus Tyrannus the original color was probably olive green, the special colors are black and yellow. In the blue jays that are blue in the adult together with black and white, the mixture of these colors gives the grays of the young, and of the less specialized forms, as Perisoreus and Picicorvus. Besides black and white, most North American genera appear to contain but two fundamental colors, but in the tropics three frequently occur in a single genus.

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[1] Evolution of the Colors af North American Land Birds. Occasional Papers of the California Academy of Sciences III. By Charles A. Keeler. San Francisco, January, 1893.

In discussing protective coloring, repetitive marks, and recognition marks, the most recent literature upon this subject is cited and illustrated with numerous facts of the author's own observation.

Having considered the factors that influence the evolution of colors of North American birds, Mr. Keeler gives a brief account of the families and genera with an application of the principles discussed.

Mr. Keeler's review of the factors of organic evolution is comprehensive and intelligent. He appreciates the fundamental difference between the origin of characters and the selection of characters, though occasionally he slips into the customary confusion on this point by ascribing the origin of some color marks to natural selection. The reviewer takes this opportunity to refer to one misunderstanding into which he in common with many others has fallen, in his reference to effort as prior to use in developing structure. He says (p. 75) "All that can be said to the above [the theory of effort] is that it may be true but that it has not yet been demonstrated. There is indeed a vast difference between the assumption that use can modify a part which already exists, and the assumption that desire or effort can originate something which does not exist. Moreover, even if effort be a valid factor in creation, it cannot it seems to me have the general application ascribed to it by Professor Cope. For example, it could apparently have no influence on the origination of new colors. Does the bird desire to be protectively colored? If so it must decide what colors would be most in harmony with its surroundings, and then make an effort of will to have these colors developed; all of which is on the face of it inconceivable. Or by what imaginable sort of effort could feathers be originated? Effort then, if it can be shown to have any creative power, must be relegated to a very special field, and cannot be considered as the sole or even principal originator of the fittest."

The above paragraph indicates a radical misconception of the proposition.

Effort is simply the conscious preliminary to motion, and motion is the fundamental efficient cause of the leading modifications of structure. No knowledge or intention as to the result or effect (final cause) of the motion is to be supposed. It is motion which changes the environment of an animal, and which is thus at the bottom of whatever results from that change, let the immediate efficient agency be physical, chemical or mechanical. The psychic cause of this effort is a sensation. Of course in purely reflex acts, effort (which is assumed to be conscious by its definition), is wanting, but the hypothesis sustained in the work quoted by Mr. Keeler, (The Origin of the Fittest), is that reflex acts have had their origin in conscious acts, and are the result of automatization, which is the ordinary process of education. Reflex motions then have had their origin in effort as well as the so-called voluntary acts, but at an earlier period. For this reason they have relatively little to do with the molar movements of animals at the present time, and therefore little to do with the *present* origin of specific characters. It is present effort which precedes most of the motions of animals, and which thus has everything to do with the environment, to which evolutionists of all shades appeal as an efficient cause.

The most important contribution towards the discovery of the origin of colors in birds by Mr. Keeler, is his demonstration of the law of the Assortment of Pigments. His classification of our birds in accordance with their color relations, is a valuable preliminary to further research. When we reach the final stage of the subject, the origin of the tints themselves, no definite progress is made in the book before us. As one of the most difficult problems in organic molecular physics, it requires a very special mode of experimental treatment, and one which Mr. Keeler has not attempted. The origin of color patterns is less difficult of approach, and some progress has been made in this direction, but the subject is yet in a very primitive stage.

The illustrations of the book are numerous and often in colors, and they add greatly to its value. The work is gotten up in excellent style, and is a credit to all concerned in its publication. C.